

VERRALLIA VIRGINICA (DIPTERA: PIPUNCULIDAE)
REARED FROM THE SARATOGA SPITTLEBUG IN MAINE

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Abstract.—A pipunculid parasite *Verrallia virginica* Banks is reared for the first time from the Saratoga spittlebug, *Aphrophora saratogensis* (Fitch). The rearing method is described and biological notes on the parasite are given.

The Saratoga spittlebug, *Aphrophora saratogensis* (Fitch), is a serious pest in young red pine, *Pinus resinosa* Aiton, plantations in the Lake States, Ontario, and more recently in the Northeast. Adults of this cercopid feed on the needle bearing twigs of their pine hosts. Nymphs of this spittlebug are found in or just below the litter surface, feeding on the stems of various herbaceous and woody plants comprising the understory vegetation in pine plantations (Anderson, 1947a; Ewan, 1961).

Anderson (1947b) reported the occurrence of a dipterous parasite attacking Saratoga spittlebug adults. Ewan (1961) found a pipunculid parasite attacking Saratoga spittlebug adults in Wisconsin. Parasitism rates in one plantation exceeded 60%, however, the parasite became effective too late to protect the plantation from spittlebug damage.

In 1974, dissections of adult Saratoga spittlebugs from eastern Maine revealed parasitic larvae of a pipunculid. During 1975, a rearing technique was developed to determine its identity.

Methods

Adult Saratoga spittlebugs were collected in several infested red pine plantations on various dates during July and August. The spittlebugs were preserved in alcoholic Bouin's solution, removed to alcohol and dissected to determine the presence of parasites. Development of the larvae was followed during the summer through dissections. When the parasitic larvae reached maturity, collections of spittlebugs were placed in gallon glass jars containing a substrate of a moist, sand-sawdust mixture. Emerging larvae formed puparia in the substrate. Puparia were then placed in vials and removed to containers with relative humidities ranging from 75 to 92%. After 10 days at room temperature (21°C), they were subjected to a cold period (3-5°C) for 75 days. Puparia were then removed to room temperature.

Results and Discussion

The first adults emerged 45 days after termination of the cold period. Ninety-two percent of the larvae treated as outlined above were successfully reared to the adult stage. Reared adults were identified as *Verrallia*

virginica Banks¹ (Thompson, 1977). Apparently this pipunculid parasitized the teneral adult of the Saratoga spittlebug about the second week of July. Larvae were first detected through dissection on July 30. Approximately 25 days later, parasitic larvae emerged and formed puparia. Larval developmental time was estimated as six to seven weeks. *Verrallia virginica* overwinters as a pupa and apparently emerges in late June or early July coinciding with the appearance of Saratoga spittlebug adults. From a limited sample, females were more heavily parasitized than males ($\chi^2 = 4.84$, $P < 0.05$). During 1975, parasitism rates never exceeded 8%.

Verrallia virginica is a former synonym of and similar to *V. aucta* (Fallén) which has been reared from *Philaenus spumarius* (Linnaeus) and *Neophilaenus lineatus* (L.) in England (Whittaker, 1969). There is no record of *Verrallia aucta* parasitizing either of these species in North America. Whittaker (1969) briefly described the biology of *V. aucta* in England. Eggs were inserted into the abdomen of teneral adult spittlebugs. There were probably two larval instars with a developmental time of 10–11 weeks. Mature second instar larvae occupied nearly the entire abdomen and reproductive organs were noticeably atrophied. Emerging larvae formed brick red puparia in which they overwintered. Adults emerged in June or July, synchronous with the appearance of their adult hosts.

Differences between the studies of Whittaker (1969) concerning *V. aucta* and our own on *V. virginica* should be noted (see Thompson, 1977). *Verrallia virginica* attacks a different genus of cercopid which occurs on a greatly different host plant. Considerable differences in the length of the larval developmental period and geographic range might also be significant.

A second type of larva was dissected from Saratoga spittlebug adults on two occasions. This presumably is another species of parasite, but no determination could be made as to its identity.

Literature Cited

- Anderson, R. F. 1947a. Saratoga spittlebug injury to pine. *J. Econ. Entomol.* 40:26–33.
- . 1947b. The Saratoga spittlebug. *J. Econ. Entomol.* 40:695–701.
- Ewan, H. G. 1961. The Saratoga spittlebug: a destructive pest in red pine plantations. Lake States Forest Exper. Station, Technical Bulletin 1250. 52 pp.
- Thompson, F. C. 1977. *Verrallia virginica* Banks, a valid species (Diptera: Pipunculidae). *Proc. Entomol. Soc. Wash.* 79:624–625.
- Whittaker, J. B. 1969. The biology of Pipunculidae (Diptera) parasitizing some British Cercopidae. *Proc. R. Entomol. Soc. Lond. A.* 44:17–24.

Footnote

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